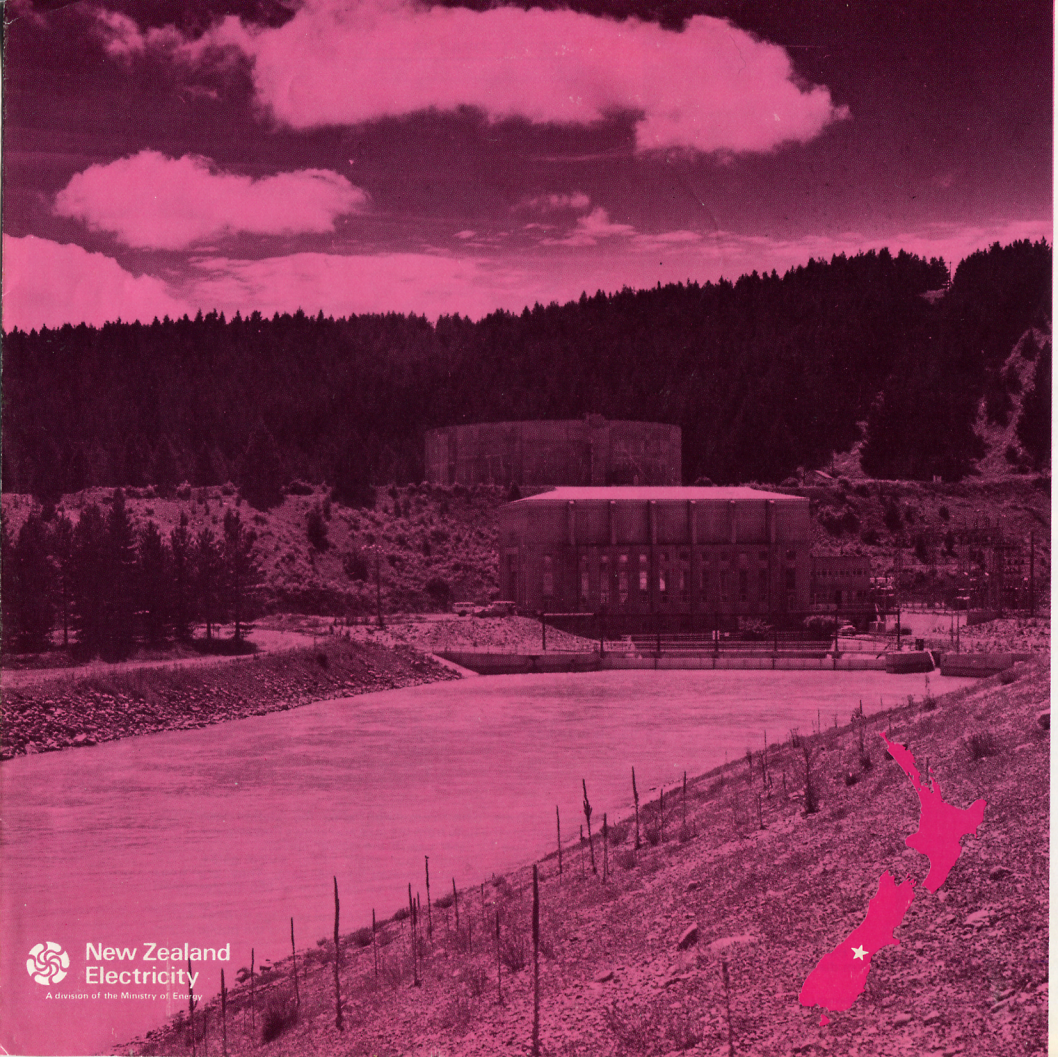


New Zealand Electricity
A division of the Ministry of Energy

tekapo A

power station

tekapo A power station

Tekapo A power station lies on the Tekapo River bank, 105 km west of Timaru, and draws water from Lake Tekapo. It is the first station on the Upper Waitaki power development scheme.
From the lake intake, water flows through the 6.1 m diameter, 1600 m long tunnel to the surge tank and through a penstock to the powerhouse, and joins the canal below the station. Tekapo A station is linked by this canal with Tekapo B situated on the shores of Lake Pukaki.

HISTORY

Construction began in 1938 but stopped during the war and did not resume until 1946.
The station was commissioned in mid 1951 but the dam, built after the station began operating, was not completed until December 1953.

THE TUNNEL

A tunnel dug through a ridge of glacial moraine, composed of gravel and boulders, brings water from the lake to the powerhouse.
A new tunnelling technique developed to cope with this unusual type of country, involved the use of two "shields"—open-ended cylinders 7.2 m in diameter and 6.1 m long, working from either end of the tunnel. Twenty-four hydraulic jacks each exerting a force of 100 tonnes pushed each shield forward, while tunnellers working on platforms in front of the shields removed the spoil by conveyor belts.
As the shields moved forward, some 22 000 reinforced concrete blocks, each weighing about a tonne, were placed to form the tunnel lining. Water-tightness was assured by grouting behind the concrete blocks. The interior was later finished with concrete to form a smooth lining. The tunnel is lined with steel for 183 m at the surge tank end.
At the tunnel's entrance in the lake is a concrete intake structure with two 6.1 m high by 3.7 m wide stop-gates.
A single hydraulically operated gate at the surge tank end allows the tunnel to be dewatered for inspection and repair.

THE SURGE TANK

Having passed through the tunnel, the water enters the surge tank, a cylindrical concrete structure, 18.3 m high and 48.8 m diameter, on an excavated site above the powerhouse.

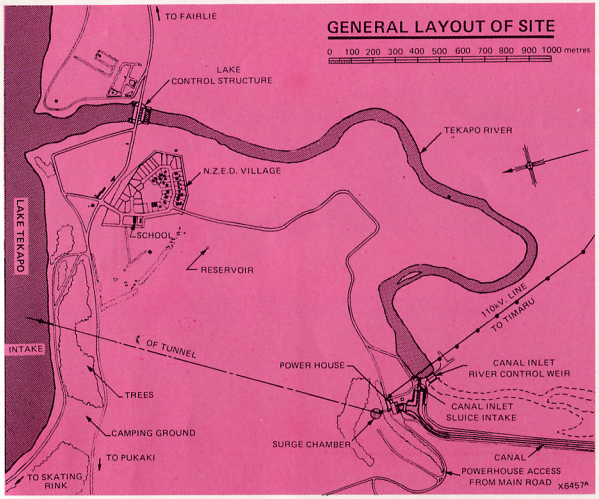
The surge tank allows the rate of flow through the turbine to be increased or decreased fairly quickly, while the corresponding change in rate of flow in the tunnel takes place more slowly.
The tank's wall is 690 mm thick at the bottom, tapering to 300 mm at the top, and is built of 8.5 m wide concrete blocks locked together by inset prestressed steel "hoops". The small gaps between the blocks have a rubber jointing, allowing for slight expansions and contractions without harm to the structure.
A feature of the tank's construction was the massive wooden scaffolding pivoted to the centre of the tank and moved around as each section was completed.

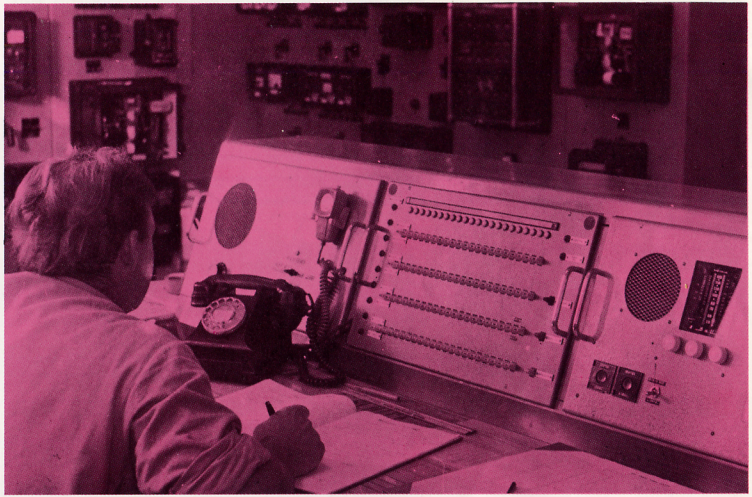
THE POWERHOUSE

From the surge tank the water drops 30.5 m to the powerhouse through the 6.1 m diameter penstock made of reinforced concrete, 610 mm thick and lined with steel.
The powerhouse is a reinforced concrete building housing one turbine, generator, and transformer manufactured by the English Electric Co. The turbine is a vertical Kaplan type operating at 150 rpm.
From the turbine the water passes through the draft tube into the tailrace to join the canal below the station which leads to Tekapo B Station.
Electricity generated at 11 000 volts is stepped up to 110 000 volts by the transformer and transmitted to Timaru.

THE DAM

The reinforced concrete dam, completed after the station was commissioned, controls the flow from the lake and allows flood waters to be stored in the lake for later use in the power station.
Excess water is spilled through four steel, radial sluice gates, approximately 11.6 m wide, incorporated in the dam. They are operated by electric winches and allow an overflow of 850 m^3 per second to be discharged.
Four cut-off walls were built under the dam to control seepage through the permeable glacial soils. The top of the dam also forms the public road across the Tekapo River.





The control room.

STATISTICS

Average annual energy output into national system ...	160 GWh
Total kilowatt rating ...	25 200 kW
Turbines	Vertical Kaplan type, 26 000 kW
Generators	1 machine of 25 200 kW at 11 000 volts
Transformer capacity ...	28 000 kVa
Lake area	88 sq km

Powerhouse

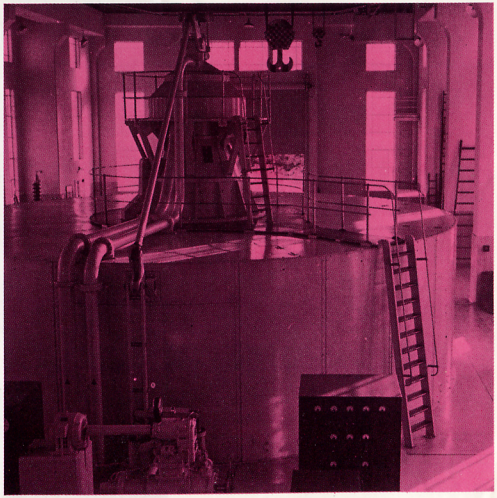
Length	52.4 m
Width	18.9 m

Dam

Length	61.0 m
Height	12.2 m

Surge Tank

Diameter	48.8 m
Height	18.3 m



The generator floor.

Photos by Electricity Division.
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tekapo

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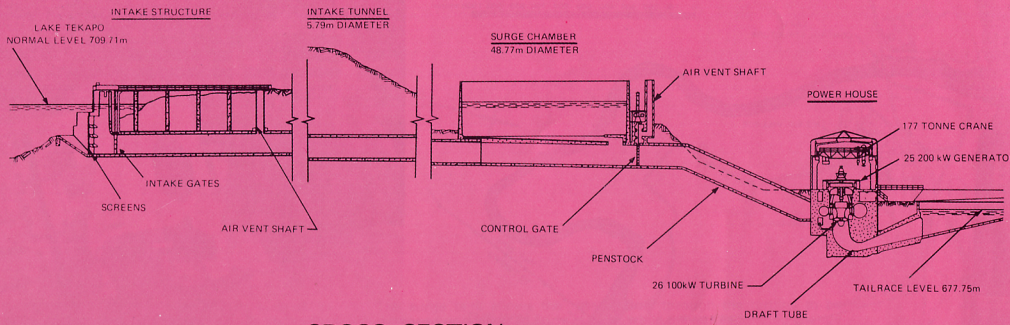

CROSS SECTION
INTAKE – POWERHOUSE

0 10 20 30 40 50m

Lake Tekapo.

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